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No. V.

Tables of Observations on the Winds, the Currents, the Gulph Stream, the Comparative Temperature of the Air and Water, &c. made on the North Atlantic Ocean, during Twenty-six Voyages to and from Europe, (principally between Philadelphia and Liverpool,) between the years 1799 and 1817, inclusive. By John Hamilton.

TABLE I.

Observations on the Winds.

Month	Day	Year	Number of days from the North.	From the Westward.	From the Eastward.	From the Southward	Variations	Month	Day	Year	S.	W.	E.	N.	Variations.	
Jan.	20	1800	2	2	10	3	3	April	30	1800		25	2	3		
	27	1804	4	13	3	1	6		30	1802		21	1	5	3	
	29	1809	12	17					30	1804		27	1	1	1	
	5	1816			2	3			30	1805		29	1			
	17	1817	2	13		1	1		16	1807		8	3	2	3	
									23	1808	2	11		5	5	
Days.	98		20	45	15	8	10	13	1812	2	5	2	3	1		
Feb.	14	1799	2	6	4		2	5				3		2		
	23	1801	1	15	1	1	5	27	1815	1	7	7	10	2		
	28	1803	3	15	5	3	2	30	1817	6	14	8		2		
	16	1812	1	5	4	6		Days.	234		11	150	25	31	17	
	25		3	18	4											
	29	1816	3	10	4	9	3	May	31	1800	2	19	7	2	1	
Days.	185		13	69	22	19	12		31	1801	1	17	3	5	5	
March	21	1799	2	13	1	3	2		23	1802	4	9	5	1	4	
	16	1803	2	11		3			27	1803	3	11	6	6	1	
	21	1805	1	15	2	2	1		17	1804		10	4	2	1	
	31	1806	5	11	11	2	2		26	1806	2	15	5	3	1	
	31	1807	1	19	8	1	2		31	1809	2	18	10	1		
	26	1808	3	13	6	2	2		25	1812	2	14	4	2	3	
	11	1812	2	5	1	2	1		13		2	9	1	1		
	18			12	2		4		5	1815			4		1	
	7	1815		1	6				26	1816	4	8	8	5	1	
	6	1816	1	1		4			9	1817		2	7			
	10	1817	5	4	1				Days.	264		22	132	64	27	19
	Days.	198		22	105	38	19	14								

REMARKS.

208	days from the Northward,
167	Southward,
361	Eastward,
1101	Westward.
192	Variable.

Days 2029

By the foregoing statement, it will be seen, that very frequently I was at sea only during part of the months.

In the division of the winds, I have called all the points of the compass between NNW. and SSW. *westerly*; those between SSW. and SSE. *southerly*; those between SSE. and NNE. *easterly*; and those between NNE. and NNW. *northerly*. The observations were all made to the northward of the latitude of 33° N. to about 55° N. The SW. winds I consider to predominate, continuing to blow very frequently a week or ten days together. Whereas NW. winds seldom blow more than three days together. Those from SSW. to SSE. for the most part produce rain, and are of short continuance; being superseded by northerly or north-west winds in a few hours.

The wind, according to the above statement, blew more than one half the time from the westward, in the aggregate; and taking the months separately, never less than half, and in some, two-thirds. From the eastward, it blew generally one-fifth or one-sixth of the month.

TABLE II.

Observations on the Currents.

Month	Lat N.	Lon. W.	Temp. of Air.	Temp. of Water.	Direction of Current.	Month	Lat N.	Lon. W.	Temp. of Air.	Temp. of Water.	Direction of Current.	
Jan.	48	24	50	53	Northerly.	April.	50	13	49	51	Northerly.	
Feb.		17	52	52	Southerly 20' per day.			15	52	50	"	
		18	48	52	" 15			19	53	50	"	
	47	25	54	52	" 14	48	26	46	51	"	"	
	45	32	53	54	" 15		14	56	50	Southerly.		
	44	34	54	55	" 17	45	26	52	54	S. W. Strong.		
		35	56	56	"	44	29	54	54	Southerly 21' sd.		
		37	47	53	" 14	42	22	62	57	"		
	42	45	59	62	" 22	May	49	16	55	52	Northerly.	
March	46	25	59	52	Southerly. Strong.		48	21	50	53	"	
		27	61	53	"		47	26	57	54	"	
	45	29	60	54	"		45	32	62	58	" 17'	
	44	33	60	56	"	43	41	65	63	"		
		37	62	57	"						"	
	41	40	62	57	"						"	

Month	Lat. N.	Lon. W.	Temp. of Air.	Temp. of Water.	Direction of Current.	Month	Lat. N.	Lon. W.	Temp. of Air.	Temp. of Water.	Direction of Current.
June	49	22	58	55	SE.	Aug.	44	35	63	62	Southerly. 23' per day.
	17	59	50	"	"		43	37	61	62	" Strong.
	48	14	56	50	Southerly.		43	39	62	64	" 26'
	46	15	59	57	" 27' per day.		43	41	67	66	" 14
	43	18	56	58	" 20		43	45	66	68	" "
	20	57	59	"	"		43	49	56	48	SE. Strong.
	36	61	63	"	" 19		43	23	64	64	Southerly 15'
	42	22	59	61	" 16		43	24	68	66	" 15
	29	58	61	"	" 20		42	50	56	55	" "
	37	66	65	"	" 25		42	25	71	67	" "
	41	40	65	63	"						
July	50	15	66	59	"	Sept.	49	25	56	55	"
	50	20	60	57	"		47	25	56	56	"
	49	12	61	59	"		47	33	62	57	Northerly. Strong.
	49	14	61	59	"		47	30	63	58	" 15'
	47	14	60	60	" 18' sd.		45	38	66	62	Southerly.
	49	17	61	59	"		45	39	65	62	"
	44	18	62	62	" 18		45	44	73	71	"
	49	19	60	58	"		45	30	63	60	"
	44	20	64	63	"		45	34	70	62	"
	42	41	75	75	NW.		45	40	61	60	"
	43	35	73	71	SW.		44	40	68	25	"
	41	30	71	70	"		42	44	60	65	"
	41	31	71	71	Southerly.		41	37	70	70	"
	41	33	74	72	SW.		41	42	67	73	SE. Current 20' sd.
	41	38	74	74	Southerly.	Octob.	49	27	58	56	Northerly. 17'
	40	42	75	75	SE. Continue in G. S.		49	23	58	58	" 15
Aug.	40	19	61	58	Southerly.		49	19	57	58	"
	49	23	60	57	"		48	33	52	58	" 74' in 3 days.
	48	20	59	59	"		48	32	58	58	" 14
	47	35	60	59	"		47	25	55	56	Southerly 16
	47	25	56	56	" Strong.		44	36	59	61	" Strong.
	47	27	58	58	"		43	47	53	58	Northerly 16'
	47	15	61	59	" 14'		43	37	59	61	Southerly. Strong.
	46	43	67	61	Northerly.		42	39	54	59	"
	46	21	60	60	Southerly.		49	16	58	57	"
	46	19	60	59	" 15'		49	18	58	57	"
	46	27	61	53	"		49	20	59	57	"
	45	30	60	61	"	Nov.					
	44	47	63	58	Northerly.	Dec.	43	49	58	45	Northerly.
	44	49	57	48	"						

REMARKS.

In the month of January I was seldom at sea ; and indeed the weather is so boisterous in that as well as the other winter months, that it is difficult, by celestial observations, to detect a current. Nor can sufficient reliance be placed on the steerage of the ship, or courses and distances by log, to be certain of the true cause of any disagreement between the dead reckoning and observations. But when the disagreement happens to be on the same side, not only during se-

veral days in succession, but for a number of voyages, there should be no hesitation in giving credit to the existence of a current. I was a long time almost induced to conclude that some of these currents, particularly those which continually prevail between the Grand Bank of Newfoundland and the coast of Europe, were periodical, running one half the year in each direction. And the foregoing Table, with a few exceptions, (and those might have been counter currents on the edge of the great stream, for I have invariably found the one always accompanying the other,) tends rather to strengthen than to invalidate such an opinion.

In February, as well as March, from latitude 41° to 48° N. the set seems to have been to the southward, without a single exception.

In April, on the parallels of 48° to 50° N. and between the meridians 13° (which is near soundings) and 26° W. its direction was northerly, while at other times, from 48° to 52° N. and from 14° to 29° W. it set to the southward.

In May, between 49° and 43° N. and 16° and 41° W. the current ran invariably to the northward.

In June, always southerly, and for the most part strong.

In July, southerly all the time. And

In August, with only two exceptions.

In September, the same.

In October, sometimes one way and sometimes the other ; but throughout the whole, I never knew the current to change from one day to another, only to vary in different years. When that from the northward has prevailed to a great extent, I have always experienced a set in the opposite direction, both in the neighbourhood of the eastern edge of the Bank of Newfoundland and along the west coast of Ireland.

These observations do not extend to the westward of the longitude of 45° W. or to the southward of 41° N. The currents to the southward and westward of these limits belong to the Gulf Stream.

TABLE III.

Observations on the Gulf Stream.

Month.	Lat. N.	Long. W.	Temp. of Air.	Temp. of Water.	Month.	Lat. N.	Long. W.	Temp. of Air.	Temp. of Water.
April 21.	32 15	77 18	70	72	June 11.	38 48	61 35	71	71
February 15.	32 40	78 9	65	71	November 1.	38 54	57 46	71	70
April 22.	34 16	75 7	61	71	5.	38 52	52 22	67	68
September 5.	34 42	69 38	79	81	December 1.	38 3	67 17	60	68
6.	35 58	71 5	76	78	October 1.	39 13	58 13	71	76
October 23.	35 38	73 23	63	73	February 21.	39 1	53 10	54	64
September 28.	36 50	66 57	67	77	December 28.	39 2	57 7	63	66
March 3.	36 40	72 11	69	72	29.	39 34	54 46	57	67
May 2.	36 49	71 42	68	74	June 7.	39 37	48 41	69	71
March 29.	37 39	67 20	60	71	July 29.	39 2	66 51	73	70
September 26.	37 42	71 7	67	73	30.	39 12	69 44	75	73
29	37 27	64 2	65	76	31.	39 41	63 39	77	74
May 2.	37 54	68	54	70	October 7.	39 14	48 54	57	67
December 23.	37 22	70 10	53	72	March 17.	39 59	58	57	58
24	37 39	69	67	72	May 24.	39 57	61 3	65	68
25.	37 56	67	63	69	November 4.	39 6	52 30	66	68
May 30.	37 36	68 42	71	73	October 2.	40 6	56 37	69	70
December 21.	37 49	63 45	59	63	3.	40 43	56 22	62	70
22.	37 47	60 10	62	63	July 31.	40 39	41 35	75	75
23.	37 54	56 15	60	63	August 1.	40 6	42 56	75	77
October 31.	37 34	61 39	71	70	2.	40 15	43 43	76	76
May 5.	37 49	68 58	53	67	3.	40 49	45 5	76	76
6.	37 34	66 59	55	68	1.	40 20	60 32	77	76
7.	37 52	64 24	57	67	2.	40 52	57 19	74	72
March 30.	38 4	64 23	69	70	29.	40 27	64 23	64	73
September 30.	38 5	62	69	77	30.	40 6	65 3	67	73
May 4.	38 2	61 15	61	69	31.	40 58	65 56	70	70
5.	38 9	57 50	68	69	September 1.	40 33	67 11	69	71
December 26.	38 30	64 21	59	70	October 13.	40 46	65 9	55	69
27.	38 26	61 33	61	70	14.	40 42	65 29	59	73
June 1.	38 25	62	65	70	July 1.	41 20	57 22	64	74
2.	38 20	59 36	64	69	October 4.	41 14	53 57	66	71
3.	38 28	58 23	65	72	16.	41 10	41 7	60	65
July 27.	38 30	68 26	72	72	September 16.	41 41	54 51	70	75
June 10.	38 40	65 55	70	73					

REMARKS.

The greater part of these longitudes having been determined by an excellent chronometer, may be depended upon as correct. It must however be evident to every navigator of observation and experience, who has been in the habit of

traversing this current, that it is impossible to define, with any degree of accuracy, its precise limits ; as it is influenced to a great degree by the wind.

Sometimes you find it spread to a greater breadth than usual, with diminished force and altered directions, (at least of several points,) at other times compressed into a narrow stream, and running with increased rapidity.

However, in the above Table, I have kept nearly in the middle of it, seldom approaching near either limit, or so far to the north or south as I have often experienced its influence.

I have observed, that after it passes the tail of the Grand Bank of Newfoundland, the main stream proceeds in a south-east direction, while several ramifications, generally not very strong in their currents, branch off to the NE. and from that to east, with counter currents in the intermediate spaces.

About two years ago, having been detained several days in that neighbourhood by light baffling winds, I had an opportunity, by my chronometer, and repeated observations through the day, of ascertaining the various directions of the currents, as well as their velocity. On both sides of the Gulf Stream, a counter current, running in the opposite direction, is invariably met with. I have frequently, with a free wind, by often attending to the temperature of the water with the thermometer, succeeded in availing myself of its assistance, so as to have the ship drifted 4° ahead of her reckoning. From the longitude of about 55° to soundings, (in the south side of the Stream) to the northward, the same effects are produced, but I think not quite in so great a degree. In George's Bank, there are regular tides. And the Gulf Stream often trespasses on the soundings to the southward of Nantucket. From thence as far as the capes of the Chesapeake, I have seldom failed to experience a SW. current.

By the frequent use of a thermometer, the navigator may always discover when he touches upon the Gulf Stream ; and if he is bound to the eastward, benefit by its current ;

or if the contrary, shun its influence. On the north side, the difference of temperature of Gulf and ocean water, is at least 10° , on an average; but greater in the winter than summer season. On the southern side of the Stream, the difference of temperature is never less than 5° . If any one will only be at the pains of trying the water two or three times in the twenty-four hours, he cannot be mistaken on this subject.

In other currents than the Gulf Stream, the water is generally from 2° to 4° warmer than out of the current.

TABLE IV.

Temperature of the Air and Water on Soundings.

Month.	Lat. N.	Temp. of Air.	Temp. of Water.	Depth.	Month.	Lat. N.	Temp. of Air.	Temp. of Water.	Depth.
OFF THE CAPES OF DELAWARE.					GEORGE'S BANK.				
March 26.	Off Capes.	48	46	Soundings.	July 8.		62	54	53 fathoms.
5.	37 45	50	44	50 fathoms.	9.	40 15	68	62	60
April 14.	37 32	56	41	35	12.	40 15	71	69	35
March 25.	Off Capes.	49	42	Soundings.	August 13.	40 54	69	62	Soundings.
6.	"	48	42	17 fathoms.	18.	40 20	70	68	60 fathoms.
8.	"	36	41	20	12.		61	55	55
April 13.	38 34	54	41	22	September 22.	40 42	65	61	50
22.	38 35	52	41	35	23.	40 13	68	62	53
23.	"	52	42	20	20.	41 23	64	54	40
10.	39 15	56	44	Soundings.	21.	41 7	65	56	45
May 1.	Off Dela.	56	50	"	22	41 12	56	56	41
2.	38 12	63	50	38 fathoms.	ON AND NEAR THE GRAND BANK OF NEWFOUNDLAND.				
18.	"	60	52	14	March 10.	42 3	52	56	Tail.
1.	"	52	44	10	13.	42 21	53	56	"
July 15.	38 50	76	74	30	April 5.	41 47	55	52	"
14.	39 6	74	71	50	May 16.	42 57	52	41	"
August 20.	39 56	73	68	60	28.	42 44	54	39	"
September 8.	38 3	67	71	Soundings.	August 5.	43 28	59	57	30 fathoms.
9.	38 23	67	65	"	21.	43 21	56	48	"
7.	38 57	64	61	"	September 15.	42 10	58	48	Tail.
8	Off Capes.	64	62	16 fathoms.	30.	43 57	51	53	Soundings.
26.	38 47	71	69	27	October 3.	42 23	53	47	Tail.
27.	39 10	62	61	26	7.	43 15	58	46	37 fathoms.
October 20.	Off Capes.	57	61	Soundings.	December 8.	42 54	58	39	Tail.
19.	38 50	57	60	20 fathoms.	9.	43 31	58	45	Soundings.
20.	38 20	57	61	15					
November 1.	39 4	51	53	16					
December 21.	Off Capes.	40	46	Soundings.					
18.	"	21	39	15 fathoms.					

Month.	Lat. N.	Temp. of Air.	Temp. of Water.	Depth.	AVERAGE TEMPERATURE OF THE WATER, OFF THE DELAWARE, IN	
OFF THE BRITISH CHANNELS.						
	°	'	°	°		°
January 30.	50	9	50	51	74 fathoms.	43
February 27.	49	39	48	47	Soundings.	43
26.	51	19	55	44	65 fathoms.	49
March 28.	49	18	53	50	Soundings.	70
27.	50	15	51	48	"	70
7.	50	29	51	45	67 fathoms.	65
7.	51	15	51	42	70	60
April 19.	49	57	50	50	80	53
22.	49	32	52	49	Soundings.	40
19.	50	51	50	49	65 fathoms.	
22.	50	51	46	48	50	
21.	50	33	49	48	Soundings.	
May 31.	49	43	57	54	76 fathoms.	
30.	50	9	54	53	67	
19.	50	28	53	58	85	
20.	50	57	54	51	80	
29.	51	40	56	53	75	
30.	51	3	52	49	65	
June 11.	50	49	54	50	70	
20.	50	55	60	57	85	
21.	50	54	62	58	Cape Clear.	
12.	51	47	55	50	40 fathoms.	
21.	51	18	63	58	Kinsale.	
July 25.	49	9	60	58	Soundings.	
24.	50	58	59	57	50 fathoms.	
August 15.	50	41	53	53	70	
20.	50	54	62	59	60	
21.	50	22	64	59	80	
17.	51	54	69	59	45	
19.	51	4	69	60	65	
October 18.	50	28	60	58	90	
3.	50	52	58	55	Soundings.	
1.	51	47	59	57	36 fathoms.	
November 22.	50	32	52	48	67	
23.	51	6	53	50	55	
December 25.	50	40	62	47	80	

March	43
April	43
May	49
July	70
August	70
September	65
October	60
November	53
December	40

—

ON GEORGE'S BANK.

July	50
August	50
September	50

—

ON THE COAST OF IRELAND

January and February about	48
March	46
April	49
May	52
June	54
July	57
August	59
October	57
November	50
December	47

AVERAGE TEMPERATURE OF THE
WATER, OFF THE DELAWARE, IN

March	.	.	.	.	43
April	.	.	.	.	43
May	.	.	.	.	49
July	.	.	.	.	70
August	.	.	.	.	70
September	.	.	.	.	65
October	.	.	.	.	60
November	.	.	.	.	53
December	.	.	.	.	40

ON GEORGE'S BANK.

July	.	.	.	.	50
August	.	.	.	.	50
September	.	.	.	.	50

ON THE COAST OF IRELAND

January and February about	.	.	.	.	48
March	.	.	.	.	46
April	.	.	.	.	49
May	.	.	.	.	52
June	.	.	.	.	54
July	.	.	.	.	57
August	.	.	.	.	59
October	.	.	.	.	57
November	.	.	.	.	50
December	.	.	.	.	47

REMARKS.

The experiments on George's Bank were too few to be satisfactory. Besides, several of the temperatures in the foregoing Table were not properly on George's Bank, but to the southward of it, where the Gulf Stream often extends, and the water is consequently always much warmer. It will be found to be uniformly the case, that the water is much colder on banks, than on soundings shelving gradually from the land. In summer, the difference of temperature of the water, on and off soundings, on the coast of

America, is not so great, as at other seasons of the year ; and on the edge of soundings, it will mostly be found to be colder than in shoaler water. On the other side of the Atlantic, at least in St George's Channel, the reverse is the case.

Off the coast of Ireland, the thermometer is of very little service in indicating soundings ; the water seldom falling more than 3° , and sometimes continuing the same as before.

In using the thermometer, I deem it quite unnecessary to take into consideration the relative temperatures of the air and water ; as the very great changes which frequently take place in the former, from day to day, have no sensible effect on the latter, which only varies with the varying seasons.

REMARKS.

The second column of Temperature of the Water is taken from a similar Table of General Jonathan Williams in his Treatise on Thermometrical Navigation.

The mean temperature of the water for each distinct month, on a particular parallel of latitude, does not always correspond with J. Williams's Table of the same kind, though the mean annual temperatures in each latitude agree very well as far down as the parallel of 40° N. when a uniformity prevails, as far as I have traced it to the south, viz. 38° N. I can, however, readily account for the water, by my observations, not being so warm, in general, as by his; as in taking the mean, I have never brought into the calculation those made in the Gulf Stream, or any other ascertained currents. Now those parallels embrace the Gulf Stream, for its course of seven or eight hundred miles at least; and you will commonly experience a current in them as far to the eastward as the Western Islands; and it is well known that the water is always warmer in currents than out of them.

My mean, between longitude 15° and 45° west, agrees with Williams's.

I believe the difference of temperature of the water in the Gulf Stream, and its counter currents, to be very small, if there be any at all, and that the breadth of the latter, particularly on the southern edge of the Gulf, is not inconsiderable. For in the early part of my acquaintance with the Gulf, before I had ascertained its limits, various courses, and the influence of the winds on these, I have several times, when steering as I supposed in the very centre of it, from the neighbourhood of the Delaware to the Banks of Newfoundland, afterwards discovered that I had been almost all the time in the counter current. I consider it more

difficult, in short, to keep in the easterly current than in the other, as the temperature of the water will always apprise you when in or out of the current ; and, with a free wind, a person, bound to the westward, has only to steer out now and then, until the temperature of the water begins to fall, and by that means he will avoid penetrating through into the Gulf. The substance called *Gulf-weed* is no mark by which the stream can be distinguished, as it is met with in great quantities throughout the middle latitudes, to the westward of the Azores, and northward of Bermuda.

TABLE VI.

Mean Temperature of the Air and Water, between the Latitudes of 40° and 50° N. and the Longitudes of 15° and 45° W.

Month.	40°		41°		42°		43°		44°		45°		46°		47°		48°		49°		50°	
	Air.	Wat.	Air.	Wat.	Air.	Wat.	Air.	Wat.	Air.	Wat.	Air.	Wat.	Air.	Wat.	Air.	Wat.	Air.	Wat.	Air.	Wat.	Air.	Wat.
January.	59	56	55	54	55	61	51	57	50	58	55	57 $\frac{1}{2}$	53	55	51	54	50	53	50	51	48	45 $\frac{1}{2}$
February.	58	59	59	56 $\frac{1}{2}$	56	60	52	55	52	54	53	54	51	52	54	52	51	51 $\frac{1}{2}$	50	50	50	47 $\frac{1}{2}$
March.	58	56	60	55 $\frac{1}{2}$	63	55	56	55	60	55	56	54	59	52	54	50	51	49	51	49	53	50
April.	61	59 $\frac{1}{2}$	55	59 $\frac{1}{2}$	58	55	54	55	60	54 $\frac{1}{2}$	55	54	55	53	53	52	48	50	52	52	52	50
May.	61	59	65	64 $\frac{1}{2}$	63	58	63	60	63	57	62	58	56	63	57	53	52	52 $\frac{1}{2}$	55	52	52	51
June.	64	62	61	63 $\frac{1}{2}$	61	61	59	60	62	60	58	57	59	56	61	56	60	55	56	53	56	55 $\frac{1}{2}$
July.	75	75	71	71 $\frac{1}{2}$	66	67	71	70	63	62	60	60	60	57	60	60	60	56	60	58	60	58
August.	75	76	68	70	67	66 $\frac{1}{2}$	64	65 $\frac{1}{2}$	62	62	60	61	61	60	59	58	58	57	59	57	60	57
September.	70	68	69	69 $\frac{1}{2}$	64	67	64	62	63	64	63	60	63	60	57	56	56	56	56	55	55	55
October.	61	60	58	59	60	56 $\frac{1}{2}$	61	60	58	59	59	56	60	57	56	56	56	56	58	57 $\frac{1}{2}$	56	55
November.	62	61	58	56 $\frac{1}{2}$	57	52	61	59	58	59	58	53	58	53	58	53	55	61	60	55	53	51
December.	60	54	55	53	55	48	54	51	59	55	56	50	55	48	54	50	50	48	66	51	59	49

REMARKS.

The figures written across the lines are the mean of the difference (when any difference occurs) between this and Table V. It is very apparent, from these observations, that although you most generally find the water become progressively colder the farther you advance to the northward, or as the season itself becomes colder, yet this does not always happen ; so that it is utterly impossible to form, with accuracy, such a Table as the ingenious Mr. Williams has attempted. Yet he is certainly entitled to a great deal of credit for the correctness of many of the deductions in his work on Thermometrical Navigation, considering the limited experiments he had an opportunity of making, in the very few voyages performed by him. He appears to have been so sanguine, as almost to believe that this science might be reduced to such perfection, as to enable the navigator to ascertain thereby the ship's place at sea. Of the fallacy of this hope, the continued experience and unremitted application of more than ten years (to and fro in the same track) have convinced me beyond a doubt. Nevertheless, I shall ever esteem the thermometer as a very important and useful instrument in navigation. Although it is not entitled to that implicit confidence that should induce a person to incur risks in running for the land or soundings in dark nights, or thick foggy weather, yet it may often apprise him of the vicinity of danger, when he does not expect it. In navigating the Atlantic, between the United States and Europe, if bound to the westward, the necessity of shunning the current of the Gulf Stream is obvious to every one, as well as the propriety of making use of its assistance when going in the opposite direction. The irregularity of the courses it pursues, together with its undefined limits, all of which are considerably changed by the prevailing winds,

render it impossible for a person to know when he is in it, by calculation, however well ascertained may be his latitude and longitude. But by the thermometer, if he will only be at the trouble of trying the water once or twice a day, he can never be mistaken in identifying this current. I have been acquainted with many ship masters who were in the habit of carrying this instrument to sea with them, but who never attempted to apply it until they deemed themselves in the neighbourhood of soundings or of the Gulf, and were consequently unqualified properly to appreciate its usefulness. For unless a person will be at the pains of making his thermometrical observations at least once a day, it is impossible he can avail himself of its good offices. It is only from the relative temperatures and changes in them that he can draw his conclusions. The extremes of heat and cold, which are not the same every year, must necessarily give to the water of the ocean a corresponding temperature ; so that (as the foregoing Tables plainly shew) in the same season, you will find this temperature very different, in different years.